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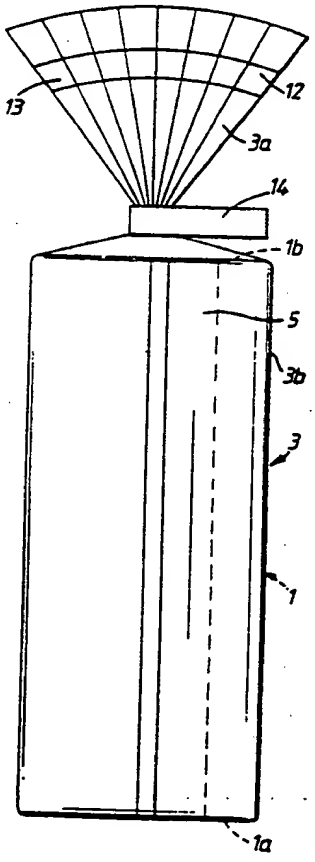
(57) Abstract

A wrapper (3) containing a food product (1), the wrapper comprising a tube (3b) of wrapping material (3a) extending around the food product and having a pleat (5), which extends along the tube, the tube being sealed at each end and the pleat being constrained to lie closed against the outer surface of the tube. The arrangement is such that, when the seal (12) at one end of the tube (3b) is broken and the wrapper (3) is opened at that end, the transverse cross-sectional area of the tube can be increased by opening the pleat (5) over at least a portion of its length to facilitate access to the food product (1) through that end of the wrapper, and, after the seal has been broken, the wrapper is so re-closable at the said one end as to constrain the pleat to lie against the outer surface of the tube upon re-closure.



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"Improvements in and relating to packaging food products"

This invention relates to packaging food products and especially to the wrapping of food products.

Two principal methods of wrapping a food product are known as "roll-wrap" and "flow-wrap", respectively.

In the roll-wrap method, the food product is laid on a sheet of wrapping material that has been severed from a web of the material. The sheet of material is wrapped around the food product, the two opposite edge portions adjacent to the severed edges of the sheet being brought together and sealed so that the sheet forms an open-ended tube around the product, and the sealed edge portions form a longitudinal seam which extends along the length of the tube. The open end portions of the tube, which extend beyond the food product, are folded and tucked in against the surface of the food product. The folds are then sealed together to provide a substantially air-tight wrapper. The surface of the wrapping material that forms the outer surface of a wrapper is referred to throughout this specification as the "a" surface and its other surface (that which forms the inner surface of the wrapper) as the "b" surface.

The longitudinal seam may be "a-b", that is to say, one edge portion of the sheet overlaps the other edge portion, and the inner (or "b") surface of the first of those edge portions is sealed to the outer (or "a") surface of the second of those edge portions. The

longitudinal seam may, instead, be "b-b", that is to say, the inner (or "b") surface of one edge portion of the sheet is sealed to the inner (or "b") surface of the other edge portion to produce a so-called "fin" seal, which may be folded flat onto the surface of the wrapped food product and sealed to the underlying portion of the wrapping material.

In the flow-wrap method, the food product is placed on a leading edge portion of a web of wrapping material. The web is progressively wrapped around the food product by bringing together the lateral edge portions of the web and, where the lateral edge portions of the web meet, a "b-b" longitudinal fin seal is formed. The web is severed and, generally, the fin seal is folded through an angle of about 90° so that it lies flat on the surface of the wrapper. Transverse "b-b" fin seals are formed at each end of the food product to seal the wrapper, each of those transverse seals lying in the same plane as the portions of the folded longitudinal seal adjacent to each end.

After a wrapper formed by either of the above methods has been opened (often not without difficulty), the quality of the food product may deteriorate if, for example, the food product is such that it readily absorbs moisture from the ambient air unless it is transferred to a tin having a close-fitting lid, or a similarly reasonably airtight enclosure.

The invention provides a wrapper containing a

food product, the wrapper comprising a tube of wrapping material extending around the food product and having a pleat, which extends along the tube, the tube being sealed at each end and the pleat being constrained to lie closed against the outer surface of the tube, the arrangement being such that, when the seal at one end of the tube is broken and the wrapper is opened at that end, the transverse cross-sectional area of the tube can be increased by opening the pleat over at least a portion of its length to facilitate access to the food product through that end of the wrapper, and, after the seal has been broken, the wrapper is so re-closable at the said one end as to constrain the pleat to lie against the outer surface of the tube upon reclosure.

The wrapper of the invention may be used to wrap a food product consisting of only a single elongate item of food, or a plurality of food items. Thus, the food product may be an assembly of food items, which may be provided with, or contained in, some other form of packaging inside the wrapper. For example, the wrapper may be used to enclose a tray having two or more compartments, each of which contains one or more food items. The provision of the longitudinal pleat makes it possible to arrange that at least a part of such a food product can easily be withdrawn through the said one end of the wrapper without rupturing the wrapping material or otherwise so damaging the wrapper as to prevent its re-closure. It is also possible for any unconsumed portion

of the food product removed from the wrapper to be replaced and the wrapper re-closed.

The assembly of food items may be an assembly of elongate items arranged with their axes parallel to each other and to the axis of the tube, or the elongate items may be arranged with their axes parallel to each other and perpendicular to the axis of the tube. More especially, however, the wrapper of the invention is advantageous when the food product comprises an assembly of disc-like items, for example, biscuits, or beefburgers, or pizzas, arranged substantially co-axially with each other and with the tube.

With a food product comprising an assembly of items, it can be arranged that, while the wrapper is sealed and the pleat is constrained to lie closed against the surface of the tube, the assembly is held securely and consequently the items are protected against damage resulting from relative movement between them. Because of the pleat, when the wrapper is opened, one or more of the food items can be readily withdrawn through the said one end of the wrapper. The wrapper can then be re-closed to protect the remaining food items.

Depending on the configuration of the food product, it is possible for the wrapper to be re-closed in such a manner that the food product (or that portion of it remaining in the wrapper) can still be held securely. For example, when the food product comprises an assembly of disc-like items arranged substantially

co-axially, after the wrapper has been opened and some of the food items removed, the wrapper can be re-closed in such a manner that the food items remaining in the wrapper are securely held in alignment.

Advantageously, the arrangement is such that, after part of the food product is removed from the wrapper so that the length of the food product in a direction along the axis of the tube is decreased, the wrapper can be re-closed at at least one position nearer to the said other end of the tube, and preferably can be re-closed progressively down the tube towards the said other end as portions of the food product are removed from the wrapper. Arrangements which can be re-closed in that manner will be referred to in more detail below.

The wrapper may be made from a pre-formed tube of the wrapping material, into which the food product is inserted, the longitudinally-extending pleat being formed before, during or after insertion of the food product. Instead, the wrapper may be made by wrapping the material around the food product, the material either being in sheet form before wrapping or being severed from a web during or after wrapping, and sealing together adjacent edge portions of the material to form a tube with a seam that extends along the length of the tube. The longitudinally-extending pleat may be formed before, during or after wrapping.

Preferably, when the wrapper has a longitudinal seam, that seam extends along the edge of the pleat. Such

a longitudinal seam is preferably formed by "b-b" sealing (that is to say, with two edge portions of the inner surface of the wrapping material sealed together), but it may also be formed by "a-a" or "a-b" sealing.

Thus, the wrapper may be made by laying the food product on a sheet of wrapping material that has been severed from a web of the material, the opposite edge portions adjacent to the severed edges being sealed together to form the longitudinal seam.

Instead, the wrapper may be made by laying the food product on a leading edge portion of a web of the wrapping material, and wrapping the web progressively around the food product, the lateral edge portions of the wrapping material being brought together to form the longitudinal seam.

To constrain the pleat to lie closed against the outer surface of the tube, there is advantageously provided a constraint on the pleat at, or adjacent to, the said one end of the tube, at least before the seal at that end is broken, and a further constraint on the pleat at, or adjacent to, the other end of the tube.

The constraint on the pleat at, or adjacent to, the said other end of the tube may be provided by causing at least a portion of the surface of the pleat at, or adjacent to, that end to adhere to the surface of the tube underlying the pleat. Instead or, preferably, in addition, that constraint may be provided by arranging that the pleat extends beyond the food product at the

said other end of the tube and is incorporated in the seal at that end, the seal being so formed as to provide the constraint. The said other end may be sealed in the roll-wrap manner (that is to say, the end portion of the tube is folded and the folds tucked in against the end surface of the food product, the folds then being heat-sealed together) or it may be sealed by heat-sealing the inner or "b" surface of the wrapper in a transverse "fin" seal. Instead, the said other end may be sealed by means of cold-seal adhesive (as hereinafter defined) applied to the "b" surface of the wrapper at, or adjacent to, that end and, if desired, in addition, the wrapper may be made of a material such that a twist closure can be formed at that end (that is to say, the material is such that the wrapper can be closed by twisting the material, and the material does not untwist to any significant extent of its own accord).

It is convenient to regard the said one end of the tube as being in any one of three states, which are, firstly, that it is sealed, secondly, that the seal is broken and it is in an opened state, and, thirdly, that it has been re-closed after opening.

In the first state, besides having a seal at the said one end of the tube to prevent the ingress of moisture, it is preferable to provide a constraint on the pleat at, or adjacent to, that end to keep the pleat lying on the surface of the tube, and it is, in addition, generally desirable to prevent movement of the food

product relative to the tube in an axial direction. In the second state, the seal has been broken and any constraint on the pleat at or adjacent to the said one end of the tube removed so that the pleat can be opened along at least a portion of its length, and movement of the food product in an axial direction relative to the tube is permitted. In the third state, the tube is re-closed after the seal has been broken, which places a requirement on the seal that it can be broken without so rupturing the wrapping material or otherwise damaging the wrapper that the tube cannot be re-closed. In addition, in the third state, the pleat is again constrained to lie against the surface of the tube.

The wrapper, which preferably extends beyond the food product at the said one end, may be so arranged that, before opening, that is to say, in the first state, it is sealed at the said one end of the tube at a position adjacent to the food product and thus is able to prevent relative movement between the food product and the tube in an axial direction. Such a seal is referred to below as an "adjacent initial seal". The adjacent initial seal may provide the constraint on the pleat at that end (although that constraint may be provided by other means as referred to below).

The adjacent initial seal may be provided by heat-sealing the wrapper at the said position adjacent to the food product, the wrapper being so sealed that the wrapping material can be peeled apart to open the wrapper

without rupturing the wrapping material. Such an arrangement is tamper-evident insofar as it would be immediately obvious to a consumer that the wrapper had been opened because such a seal cannot be reinstated once it has been broken.

Instead, the adjacent initial seal may be provided using cold-seal adhesive (that is to say, a composition that, when it has been applied to a surface, can adhere at ambient temperature to the same or a similar composition that has been applied to either a different part of the surface or to a different surface) on the inner or "b" surface of the tube at the said position adjacent to the food product. Again, it is possible for such a seal to be broken without rupturing the wrapping material, and, if a cold-seal adhesive is used that retains its adhesive properties, at least to some extent, after the initial opening of the wrapper, re-closure may be effected by simply bringing together opposite portions of the "b" surface of the tube or by gathering or twisting the tube at the said position, so that the tube is re-closed with the pleat constrained to lie against the outer surface of the tube.

In another arrangement, the adjacent initial seal is provided by a twist closure, the material from which the wrapper is made being such that, at least initially, the wrapper can be sealed at the said position adjacent to the food product by twisting the material, and the material does not untwist to any significant extent of

its own accord. Such a twist closure is advantageously formed by rotating the portion of the wrapper extending beyond the food product at the said one end relative to the remainder of the wrapper about the axis of the tube by at least 360° and, preferably, by at least 1080°. For re-closure of that arrangement, it may be found that the twist closure can be reinstated after opening, at least to some extent, reimposing a constraint on the pleat. If it is found that that twist closure cannot be re-instated, or remain reinstated, to a sufficient extent (it is possible with some wrapping materials that the twist closure once reinstated might gradually untwist) cold-seal adhesive may be provided on the "b" surface of the wrapper at the said position adjacent to the food product to effect or aid re-closure. Alternatively, cold-seal adhesive may be applied to a portion of the "a" surface of the wrapper, and especially to a portion of the surface of the pleat and to the adjacent underlying surface of the tube itself.

For an adjacent initial seal using cold-seal adhesive or a twist closure as referred to above to be tamper-evident, closure means may be provided around the outside of the wrapper at the said position adjacent to the food product, which closure means can only be removed in a manner that destroys the closure means. For example, a paper tape that can only be removed by tearing or cutting it may be provided around the outside of the adjacent initial seal.

At least when the adjacent initial seal is formed by heat-sealing, externally applied re-closure means, for example, a clip, tag or tie, may be provided for re-closing the tube at the said position and reimposing a constrain on the pleat at that position, or the wrapping material may be such that a twist closure can be formed for re-closure. In another arrangement, a portion of the wrapper may be formed with a ridge that mates with a groove formed in an opposite portion of the wrapper to provide re-closure.

Instead of having an adjacent intital seal as referred to above, the wrapper may be so arranged that it is sealed at the said one end of the tube at a position separated from the adjacent end of the food product (which seal is referred to below as a "separated initial seal") and so closed at a position adjacent to the food product as to prevent relative movement between the food product and the tube in an axial direction. That closure may also be arranged to provide the constraint on the pleat. The separated initial seal may be formed by heat-sealing opposing portions of the "b" surface of the wrapper together at the said position separated from the food product, and the seal may be so positioned that a portion of the wrapper including the seal can be cut off on opening the wrapper while still allowing the wrapper to be re-closable. Such an arrangement is also tamper-evident. Alternatively, the separated initial seal may be provided using cold-seal adhesive on the "b" surface

of the wrapper at the said position separated fr the food product.

When the wrapper has a separated initial seal, it may be closed at the position adjacent to the foc product in a manner which renders the arrangemen tamper-evident using closure means, similar to that refe red to above, around the outside of the wrapper at the said position adjacent to the food product, which closure means can only be removed in a manner that destro s the closure means. For example, the closure means may be a paper tape that can only be removed by tearing or cutting it. Instead, the wrapper may be closed at the position adjacent to the food product in a manner which can be used to re-close the tube after the separated initial seal has been broken and the tube has been opened. Thus the wrapper may have cold-seal adhesive applied to its "b" surface at the said position adjacent to the food product. Alternatively, or in addition to the above arrangements, externally applied closure means, for example, a clip, tag or tie, may be provided for use at the said position adjacent to the food product, or the wrapper may be arranged to be twisted or gathered to provide the closure and/or re-closure, and/or provided with a mating ridge and groove arrangement as described above. In any of those arrangements, re-closure can be effected in such a manner as to constrain the pleat to lie against the outer surface of the tube.

As has been referred to above, it is advantageous

for the arrangement to be such that, after part of the food product has been removed from the wrapper so that the length of the food product in a direction along the axis of the tube is decreased, the wrapper can be re-closed at at least one position nearer to the said other end, such positions being referred to as "lower positions". That arrangement may be achieved using twist closures (with appropriate wrapping material) or externally applied closure means, for example, a clip, tag or tie, but is preferably achieved by the provision of cold-seal adhesive on the "b" surface of the tube at the said lower positions. Advantageously, the wrapper can be re-closed progressively down the tube towards the said other end as portions of the food product are removed from the tube. To achieve such an arrangement, cold-seal adhesive may be applied to the "b" surface of the tube for at least the greater portion of its length extending from the said one end. It will usually be found that only partial coverage of the "b" surface of the wrapper is necessary to effect such re-closure. For example, the cold-seal adhesive may be applied to the "b" surface of the wrapper in a grid pattern.

Instead, or in addition, to relying on the seal or the closure or re-closure means to provide the constraint on the pleat at the said one end, at least a portion of the pleat adjacent to the said one end may be caused to adhere to the surface of the tube underlying the pleat in such a manner that it can be readily

released from that surface when it is desired to enlarge the transverse cross-sectional area of the tube to gain access to the food product. Advantageously, the pleat is caused to adhere to the surface of the tube in that manner along substantially the entire length of the food product. The pleat can be gradually peeled away from the surface of the tube and opened to enable the consumer to obtain access to lower portions of the food product.

In addition to the arrangements described above for sealing the said other end of the tube, it may be arranged for the said other end of the tube to be sealed in any of the arrangements described above for sealing the said one end of the tube.

Although only one longitudinally-extending pleat is referred to above, two or more such pleats may be provided. The desired enlargement to the wrapper on opening, and hence the width of the or each pleat and the number of pleats, will depend upon a number of factors including the nature of the food product, its dimensions, especially its dimensions in a direction along the axis of the tube, and the desired benefit to the consumer. Advantageously, the enlargement is such as to allow access by a consumer to the bottom of the tube without damaging the wrapper.

The cross-section of the food product will usually be round (including circular and oval), but it may be rectangular or triangular, or even of some other shape. The invention is especially useful when the food

product is, for example, an assembly of biscuits, both because such items are often susceptible to damage if they are not held securely and because they may deteriorate rapidly when they are freely exposed to ambient air. The items may be individually wrapped before packaging in accordance with the invention. It may also be desirable for there to be further protection or location of the food product within the wrapper by providing additional packaging, for example, a tray, or outside the wrapper, for example, a box in which the wrapper is located. Because the wrapper of the invention can be arranged to hold the food product securely, however, such additional packaging may not needed or may not have to be as substantial as in conventional wrapping methods.

The invention also provides a method of forming a wrapper containing a food product in accordance with the invention.

The invention also provides apparatus for forming a wrapper containing a food product in accordance with of the invention.

Several forms of wrapper and methods of forming wrappers containing food products in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective diagrammatic view of a food product comprising an assembly of disc-like food items arranged coaxially and laid on a sheet of wrapping

material in a first stage of a method of forming a first form of wrapper;

Fig. 2 is a perspective diagrammatic view of the food product and wrapping material shown in Fig. 1 after formation of a longitudinal seam;

Fig. 3 is a perspective diagrammatic view of the food product and wrapping material of Figs. 1 and 2, at a later stage in the method with one end of the wrapper sealed;

Fig. 4 is a perspective diagrammatic view of a second form of wrapper during formation with one end sealed;

Fig. 5 is a diagrammatic side view of the first form of the wrapper sealed at each end;

Fig. 6 is a diagrammatic side view of the wrapper of Fig. 5 opened at its upper end to gain access to the food product;

Fig. 7 is a diagrammatic side view of the wrapper of Fig. 6 after some of the food product has been removed and the opened end of the wrapper re-closed;

Fig. 8 is a diagrammatic side view of a third form of wrapper similar to the first form of wrapper but with its upper end sealed in a different manner;

Fig. 9 is a diagrammatic side view of a fourth form of wrapper;

Fig. 10 is a diagrammatic side view of a fifth form of wrapper; and

Fig. 11 is a diagrammatic side view of a sixth

form of wrapper.

Referring to Figs. 1 to 3 and 5 to 7 of the accompanying drawings, a food product, indicated generally by the reference numeral 1, comprising an assembly of disc-like food items 2 arranged substantially co-axially, is wrapped in a sheet of wrapping film 3a, to form a wrapper, indicated generally by the reference numeral 3 (see Figs. 5 to 7).

To form the wrapper 3, the food product 1 is laid on the sheet of wrapping material 3a (see Fig. 1) which has been cut from a web (not shown) extending in a direction perpendicular to the axis of the food product. The sheet 3a is then wrapped round the food product 1 (see Fig. 2) and the inner or "b" surfaces of the edge portions of the sheet that are thereby brought into proximity with one another are sealed together to form a longitudinally-extending seam 4. As can be seen from Fig. 2, the cross-sectional area of the cylindrical (but not right circular cylindrical) volume enclosed by the wrapping material 3a at that stage is significantly greater than the cross-sectional area of the food product 1.

After the seam 4 has been formed, a longitudinally-extending pleat 5 is made in the wrapping material 3a, with the seam 4 extending along the edge of the pleat 5. The pleat 5 is of such a width that the remainder of the wrapping material 3a forms a tube 3b around the food product 1, which tube contacts the

periphery of each of the food items 2. The pleat 5 is folded down onto the curved surface of the tube 3b, so that the food items 2 are firmly held in co-axial alignment.

The part of the wrapping material 3a, including a part of the pleat 5 that extends beyond one end surface 1a of the food product 1 is folded over and tucked in flat onto the end surface 1a, the various overlapping portions of the wrapping material being sealed together, for example, by heat sealing, as in a conventional roll-wrap package (see Fig. 3) to form a sealed end closure 6. In use, that end of the wrapper 3 remains sealed.

In a second method of forming a wrapper, which is indicated generally by the reference numeral 7 in Fig. 4, a food product 8 is laid on a leading edge portion of a web of wrapping material 7a, with the axis of the food product extending along the length of the web, and the web is wrapped progressively around the food product, lateral edge portions of the web of wrapping material being brought together to form a longitudinal seam 9. The web is severed, and a longitudinally-extending pleat 10 is formed and folded flat onto the surface of the wrapping material 7a, which forms a tube 7b around the food product 8. The part of the wrapping material 7a extending beyond end surface 8a of the food product including part of the pleat 10 is heat-sealed together in a flat transverse "fin" seal 11 as shown in Fig. 4.

In each form of wrapper described above, the

inclusion of a portion of the pleat 5 and 10, respectively, in the sealed end closure 6 and 11, respectively, provides a constraint on the pleat at, or adjacent to, the end 1a and 8a, respectively, of the food product to cause the pleat to lie closed against the outer surface of the tube 3b and 7b, respectively, of wrapping material.

As shown in Fig. 5, the wrapping material 3a of the first form of the wrapper 3 extends considerably beyond upper end 1b of the food product 1. At that end, the wrapper 3 is sealed at a position separated from the end 1b of the food product 1 by means of a band 12 of cold-seal adhesive applied by, for example, printing on the inner or "b" surface of the wrapper. Opposite portions of the "b" surface of the wrapper 3 are pressed together to form a seal 13. That seal 13 can be broken by peeling apart the wrapping material 3a without rupturing it. The wrapper 3 is also closed at a position adjacent to the end 1b of the food product 1 by a paper tape 14 that extends around the outside of the wrapper and draws it together, preventing relative movement between the food product 1 and the tube of wrapping material in an axial direction and applying a constraint on the pleat 5 adjacent to that end of the food product 1 to keep the pleat lying closed on the outer surface of the tube 3b. The paper tape 14 can only be removed by tearing or cutting it. Thus, the fact that the tape 14 is intact is evidence that the wrapper has not been

opened and re-closed, and renders the wrapper "tamper-evident". Portions of the surface of the pleat 5 in contact with the curved surface of the wrapper 3 adjacent to the ends 1a and 1b, respectively, of the food product 1, or even the surface of the pleat along substantially its entire length, may also be caused to adhere to the surface of the tube 3b in a manner in which it can be easily peeled off.

When it is desired to open the wrapper 3, the seal 13 is broken by peeling apart the wrapping material 3a and the tape 14 is removed. As shown in Fig. 6, the pleat 5 can then be opened at least along a portion of its length to increase the transverse cross-sectional area of the tube 3b over that portion of its length and allow easy access to the food product 1. The whole or only a portion of the food product 1 can be readily withdrawn from the wrapper 3, and some or all of that food product can easily be replaced in the wrapper 3, if desired.

From the position at which the wrapper 3 is closed by the tape 14 down to position near to the end 1a of the food product 1, the inner or "b" surface of the tube 3b has cold-seal adhesive (not shown) applied to it in a grid pattern. That grid of cold-seal adhesive allows the wrapper 3 to be re-closed either at the position at which it was closed by the tape 14 or, progressively, at any one of a number of lower positions down the wrapper as items 2 of the food product 1 are

removed. The wrapper 3 can be re-closed simply by drawing together the wrapping material 3a and pressing portions of the inner surface together to cause adhesion. Re-closure at any of the positions can be made after closing the pleat 5 and in such a manner as to constrain the pleat to lie closed against the surface of the tube so that remaining food items 2 are securely held by the wrapper 3. In Fig. 7 the wrapper 3 is shown re-closed after removal of several items 2 of the food product.

A different arrangement for the upper end of the wrapper 3 from that shown in Figs. 5, 6 and 7 is shown in Fig. 8 (the same reference numerals being used where appropriate), in which a heat-seal 15 is made during the formation of the wrapper immediately adjacent to the end 1b of the food product 1 in such a manner as to provide a constraint on the pleat 5 to keep it closed against the curved surface of the tube 3b. The heat-seal 15 is such that it can be broken by the consumer by peeling the wrapping material 3a apart without rupturing the wrapping material. Such a heat-seal also provides tamper evidence because the seal cannot be reinstated once it has been broken. The wrapper 3 is provided with a tear-off portion 16 which forms a tie that can be used to re-close the wrapper 3 after the seal 15 has been broken in such a manner as to re-impose a constraint on the pleat 5.

Another arrangement for the upper end of the wrapper 3 is shown in Fig. 9 in which a "bar" heat-seal 16 is formed at a position separated from the upper end

1b of the food product and a band of cold-seal adhesive 17 is provided at a position adjacent to the end 1b of the food product to close the tube 3b, preventing relative movement between the food product 1 and the tube and also constraining the pleat 5. To open the wrapper 3, a portion of the wrapping material 3c including the heat-seal 16 can be cut off along the broken line C and the wrapping material peeled apart at the cold-seal closure 17 to give access to the food product. The closure 17 can then be used to provide re-closure of the wrapper 3, the cold-seal adhesive retaining its adhesive properties, at least to some extent, after the initial opening of the wrapper.

In a further form of the wrapper 3 shown in Fig. 10, a band of cold-seal adhesive 18 is applied to the "b" surface of the wrapping material 3a at a position adjacent to the end 1b of the food product, that band of cold-seal adhesive providing both the initial seal and re-closure of the wrapper.

Any of the arrangements shown in Figs. 8, 9 and 10 may be provided with a grid of cold-seal adhesive extending down the inner surface of the tube 3b as desribed with reference to Fig. 7 for providing re-closure at lower positions, if desired.

In Figure 11, the wrapper 3 is sealed at a position 19 adjacent to the end 1b of the food product 1 by a twist closure, the wrapping material 3a being such that it can be twisted to form the closure and does not

untwist to any significant extent of its own accord. To form the twist closure, the part of the wrapping material 3a extending beyond the upper end 1b of the food product 1 is rotated relative to the remainder of the wrapper 3 and the food product about the axis of the tube 3b by at least 360° (one complete turn) and preferably by at least 1080° (three complete turns). The sense of the rotation is such that the pleat 5 is constrained to lie against the surface of the tube 3b. A paper tape 20, which is adhesive on its inner surface, is secured around the twist closure, and can only be removed by cutting or tearing, thus rendering the wrapper 3 tamper-evident. Re-closure of the wrapper 3, once opened, can be effected by reinstating the twist closure, thus reimposing the constraint on the pleat. If the wrapping material 3a is such that the twist closure cannot be reinstated to an extent sufficient to provide a satisfactory closure, or tends to untwist to any significant extent after reinstatement, cold-seal adhesive may be provided on the "b" surface of the wrapper 3 at the position 19 to aid re-closure. Alternatively, cold-seal adhesive may be provided on a portion of the "a" surface of the wrapper 3 forming the surface of the pleat 5 that lies against the tube 3b and the underlying surface of the tube itself. With such an arrangement, re-closure at lower positions down the tube can be effected with twist closures, or a grid of cold-seal adhesive can be provided on the "b" surface as described above.

The second form of the wrapper shown in Fig. 4 may be closed at its other end 7b in a manner similar to any of those shown in Figs. 5 to 11.

Claims:

1. A wrapper containing a food product, the wrapper comprising a tube of wrapping material extending around the food product and having a pleat, which extends along the tube, the tube being sealed at each end and the pleat being constrained to lie closed against the outer surface of the tube, the arrangement being such that, when the seal at one end of the tube is broken and the wrapper is opened at that end, the transverse cross-sectional area of the tube can be increased by opening the pleat over at least a portion of its length to facilitate access to the food product through that end of the wrapper, and, after the seal has been broken, the wrapper is so re-closable at the said one end as to constrain the pleat to lie against the outer surface of the tube upon re-closure.

2. A wrapper as claimed in claim 1, containing a food product consisting of a single elongate item of food.

3. A wrapper as claimed in claim 1, containing a food product comprising an assembly of items.

4. A wrapper as claimed in claim 3, wherein the assembly of food items is provided with, or contained in, another form of packaging inside the wrapper.

5. A wrapper as claimed in claim 3 or claim 4, wherein the food product comprises as assembly of elongate items arranged with their axes parallel to each other and to the axis of the tube.

6. A wrapper as claimed in claim 3 or claim 4,

wherein the food product comprises as assembly of elongate items arranged with their axes parallel to each other and to perpendicular to the axis of the tube.

7. A wrapper as claimed in claim 3 or claim 4, wherein the food product comprises an assembly of disc-like items arranged substantially co-axially.

8. A wrapper as claimed in claim 7, wherein the disc-like items are biscuits.

9. A wrapper as claimed in claim 7, wherein th disc-like items are beefburgers or pizzas.

10. A wrapper as claimed in any one of claims 1 to 9, wherein the arrangement is such that, after part of the food product is removed from the wrapper so that the length of the food product in a direction along the axis of the tube is decreased, the wrapper can be re-closed at at least one position nearer to the said other end of the tube.

11. A wrapper as claimed in claim 10, wherein the arrangement is such that the wrapper can be re-closed progressively down the tube towards the said other end.

12. A wrapper as claimed in any one of claims 1 to 11, wherein the wrapper has a longitudinal seam, and that seam extends along the edge of the pleat.

13. A wrapper as claimed in claim 12, wherein the longitudinal seam is formed by "b-b" sealing.

14. A wrapper as claimed in any one of claims 1 to 13, wherein , to constrain the pleat to lie closed against the outer surface of the tube, there is provided

a constraint on the pleat at, or adjacent to, the said one end of the tube, at least before the seal at that end is broken, and a further constraint on the pleat at, or adjacent to, the other end of the tube.

15. A wrapper as claimed in any one of claims 1 to 14, wherein the constraint on the pleat at, or adjacent to, the said other end of the tube is provided by causing at least a portion of the surface of the pleat at, or adjacent to, that end to adhere to the surface of the tube underlying the pleat.

16. A wrapper as claimed in any one of claims 1 to 15, wherein the constraint on the pleat at, or adjacent to, the said other end is provided by arranging that the pleat extends beyond the food product at the said other end of the tube and is incorporated in the seal at that end, the seal being so formed as to provide the constraint.

17. A wrapper as claimed in any one of claims 1 to 16, wherein the said other end is sealed by folding the end portion of the tube and tucking in the folds against the end surface of the food product, the folds then being heat-sealed together.

18. A wrapper as claimed in any one of claims 1 to 16, wherein the said other end is sealed by heat-sealing the "b" surface of the wrapper in a transverse fin seal.

19. A wrapper as claimed in any one of claims 1 to 16, wherein the said other end is sealed by means of cold-seal adhesive (as hereinbefore defined) applied to

the "b" surface of the wrapper at, or adjacent to, that end.

20. A wrapper as claimed in any one of claims 1 to 19, wherein the wrapper extends beyond the food product at the said one end.

21. A wrapper as claimed in any one of claims 1 to 20, wherein the wrapper is so arranged that, before opening, it is sealed at the said one end of the tube at a position adjacent to the food product.

22. A wrapper as claimed in claim 21, wherein the wrapper is sealed at the said one end in such a manner that the seal provides the constraint on the pleat at that end.

23. A wrapper as claimed in claim 21 or claim 22, wherein the seal is provided by heat-sealing the wrapper at the said position adjacent to the food product, the wrapper being so sealed that the wrapping material can be peeled apart to open the wrapper without rupturing the wrapping material.

24. A wrapper as claimed in claim 21 or claim 22, wherein the seal at the said one end is provided using cold-seal adhesive (as hereinbefore defined) on the "b" surface of the tube at the said position adjacent to the food product.

25. A wrapper as claimed in claim 24, wherein the cold-seal adhesive retains its adhesive properties, at least to some extent, after the initial opening of the wrapper so that the wrapper can be re-closed by bringing

together opposite portions of the "b" surface of the tube at the said position.

26. A wrapper as claimed in claim 21 or claim 22, wherein the seal at the said one end is provided by a twist closure.

27. A wrapper as claimed in claim 26, wherein the twist closure is formed by rotating the portion of the wrapper extending beyond the food product at the said one end relative to the remainder of the wrapper about the axis of the tube by at least 360° and, preferably, by at least 1080°.

28. A wrapper as claimed in claim 26 or claim 27, wherein cold-seal adhesive is provided on the "b" or "a" surface of the the wrapper to effect or aid re-closure.

29. A wrapper as claimed in any one of claims 24 to 28, wherein closure means is provided around the outside of the wrapper at the said position adjacent to the food product, which closure means can only be removed in a manner that destroys the closure means.

30. A wrapper as claimed in claim 29, wherein the closure means is a paper tape that can only be removed by tearing or cutting it.

31. A wrapper as claimed in any one of claims 21 to 30, wherein externally applied re-closure means is provided for re-closing the tube at the said position

32. A wrapper as claimed in any one of claims 21 to 30, wherein the wrapping material is such that a twist closure can be formed at the said position for

re-closure.

33. A wrapper as claimed in any one of claims 1 to 20, wherein the wrapper is so arranged that it is sealed at the said one end of the tube at a position separated from the adjacent end of the food product and so closed at a position adjacent to the food product as to prevent relative movement between the food product and the tube in an axial direction.

34. A wrapper as claimed in claim 33, wherein the wrapper is so closed at the position adjacent to the food product as to provide the constraint on the pleat.

35. A wrapper as claimed in claim 33 or claim 34, wherein the seal is formed by heat-sealing opposing portions of the "b" surface of the wrapper together at the said position separated from the food product.

36. A wrapper as claimed in any one of claims 33 to 35, wherein the seal is so positioned that a portion of the wrapper including the seal can be cut off on opening the wrapper.

37. . A wrapper as claimed in claim 33 or claim 34, wherein the seal is provided using cold-seal adhesive on the "b" surface of the wrapper at the said position separated from the food product.

38. A wrapper as claimed in claim 37, wherein the wrapper is closed at a position adjacent to the food product by closure means around the outside of the wrapper at the said position, which closure means can only be removed in a manner that destroys the closure

means.

39. A wrapper as claimed in any one of claims 33 to 37, wherein the wrapper is closed at the position adjacent to the food product in a manner which can be used to re-close the tube after the seal has been broken and the tube has been opened.

40. A wrapper as claimed in claim 39, wherein the wrapper has cold-seal adhesive applied to its "b" surface at the said position adjacent to the food product.

41. A wrapper as claimed in claim 39 or claim 40, wherein externally applied closure means is provided at the said position adjacent to the food product.

42. A wrapper as claimed in claim 39 or claim 40, wherein the wrapper is arranged to be twisted or gathered to provide closure and/or re-closure.

43. A wrapper as claimed in any one of claims 1 to 42, wherein the wrapper is so arranged that it can be re-closed at at least one lower position nearer to the said other end, and cold-seal adhesive is applied to the "b" surface of the tube at the said lower position.

44. A wrapper as claimed in claim 43, wherein cold-seal adhesive is applied to the "b" surface of the tube for at least the greater portion of its length extending from the said one end.

45. A wrapper as claimed in claim 44, wherein the cold-seal adhesive is applied to the "b" surface of the tube in a grid pattern.

46. A wrapper as claimed in any one of claims 1 to

45, wherein the constraint on the pleat at the said one end is provided by causing at least a portion of the pleat adjacent to the said one end of the tube to adhere to the surface of the tube underlying the pleat in such a manner that it can be readily released from that surface.

47. A wrapper as claimed in any one of claims 1 to 46, wherein the pleat is caused to adhere to the surface of the tube underlying the pleat along substantially the entire length of the food product in such a manner that it can be readily released from that surface.

48. A wrapper as claimed in any one of claims 1 to 47, wherein two or more such longitudinally-extending pleats are provided.

49. A wrapper as claimed in any one of claims 1 to 48, wherein the cross-section of the food product is round.

50. A wrapper containing a food product substantially as hereinbefore described with reference to, and as shown in, Figs. 1, 2, 3, 5, 6 and 7 of the accompanying drawings, or modified as shown in Figs. 4, 8, 9, 10 or 11 of the accompanying drawings.

51. A method of forming a wrapper containing a food product as claimed in any one of claims 1 to 50.

52. A method as claimed in claim 51, wherein the wrapper is made from a pre-formed tube of the wrapping material, into which the food product is inserted, the longitudinally-extending pleat being formed before, during or after insertion of the food

product.

53. A method as claimed in claim 51, wherein the wrapper is made by wrapping the material around the food product, the material either being in sheet form before wrapping or being severed from a web during or after wrapping, and sealing together adjacent edge portions of the sheet to form a tube with a seam that extends along the length of the tube, the longitudinally-extending pleat being formed before, during or after wrapping.

54. A method as claimed in claim 53, wherein the longitudinal seam is formed by "b-b" sealing.

55. A method as claimed in claim 53 or claim 54, wherein the wrapper is made by laying the food product on a sheet of wrapping material that has been severed from a web of the material, the two opposite edge portions adjacent to the severed edges being sealed together to form the longitudinal seam.

56. A method as claimed in claim 53 or claim 54, wherein the wrapper is made by laying the food product on a leading edge portion of a web of the wrapping material, and wrapping the web progressively around the food product, the lateral edge portions of the wrapping material being brought together to form the longitudinal seam.

57. A method of forming a wrapper containing a food product substantially as hereinbefore described with reference to the accompanying drawings.

58. Apparatus for forming a wrapper containing a food product by a method as claimed in any one of claims 51 to 57.

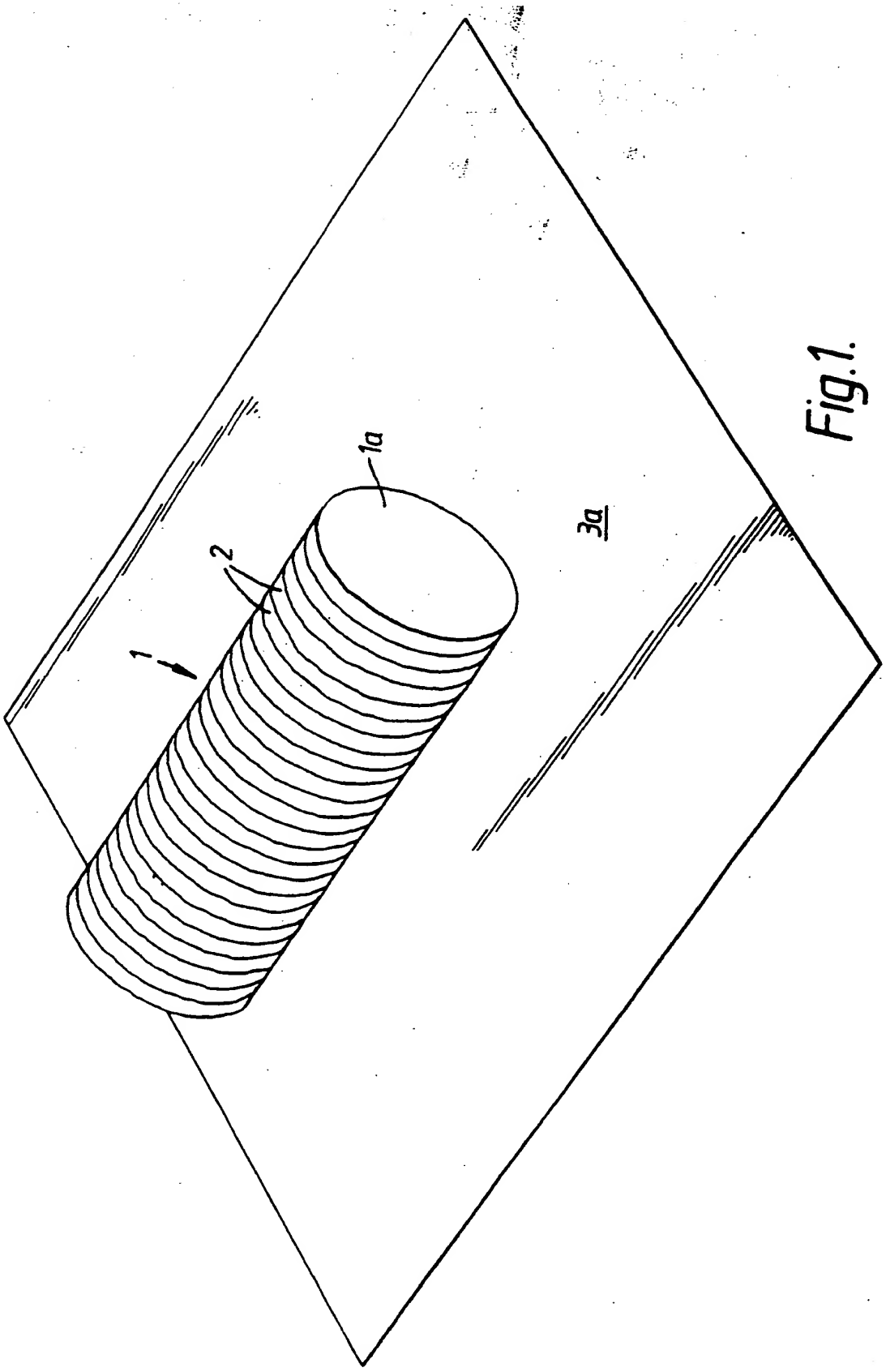
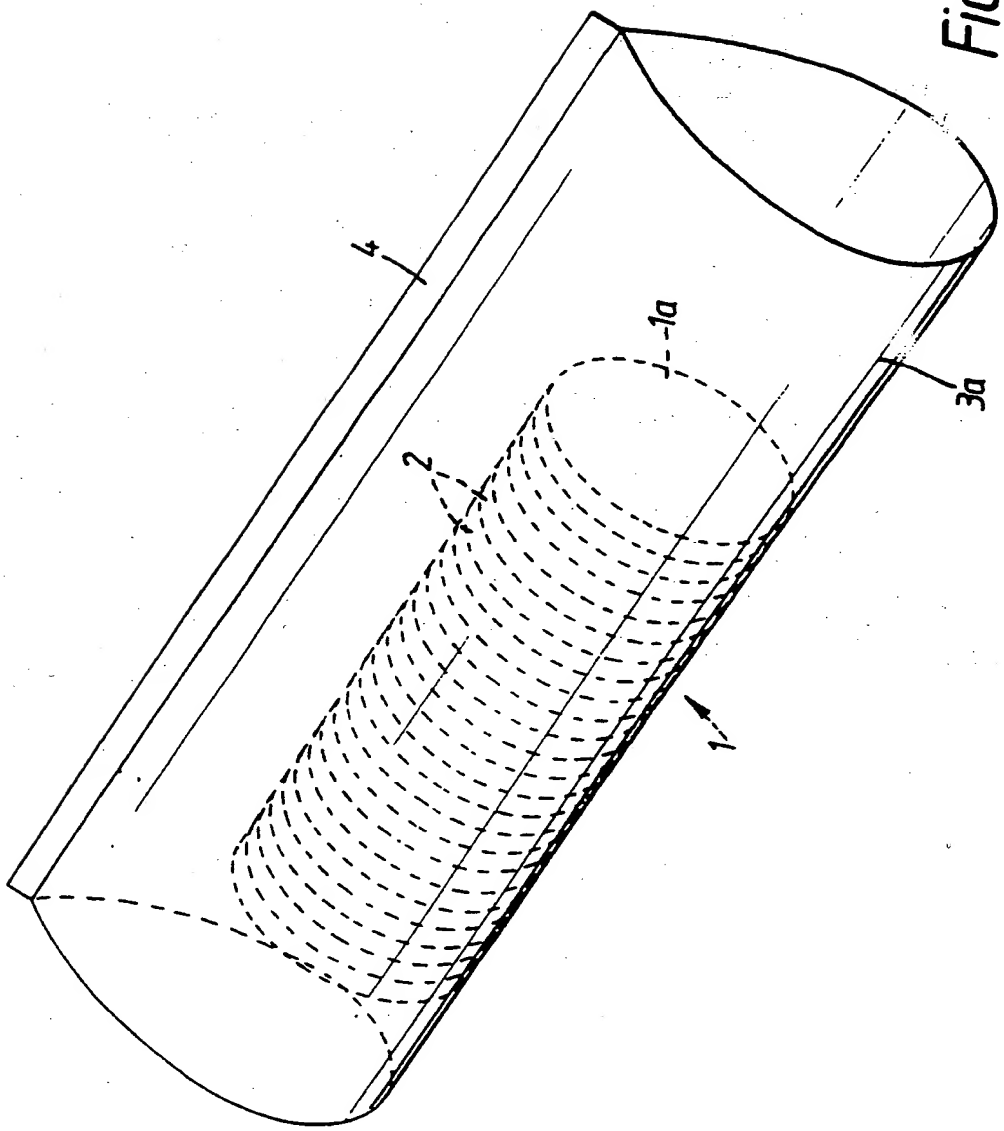


Fig.1.

Fig.2.



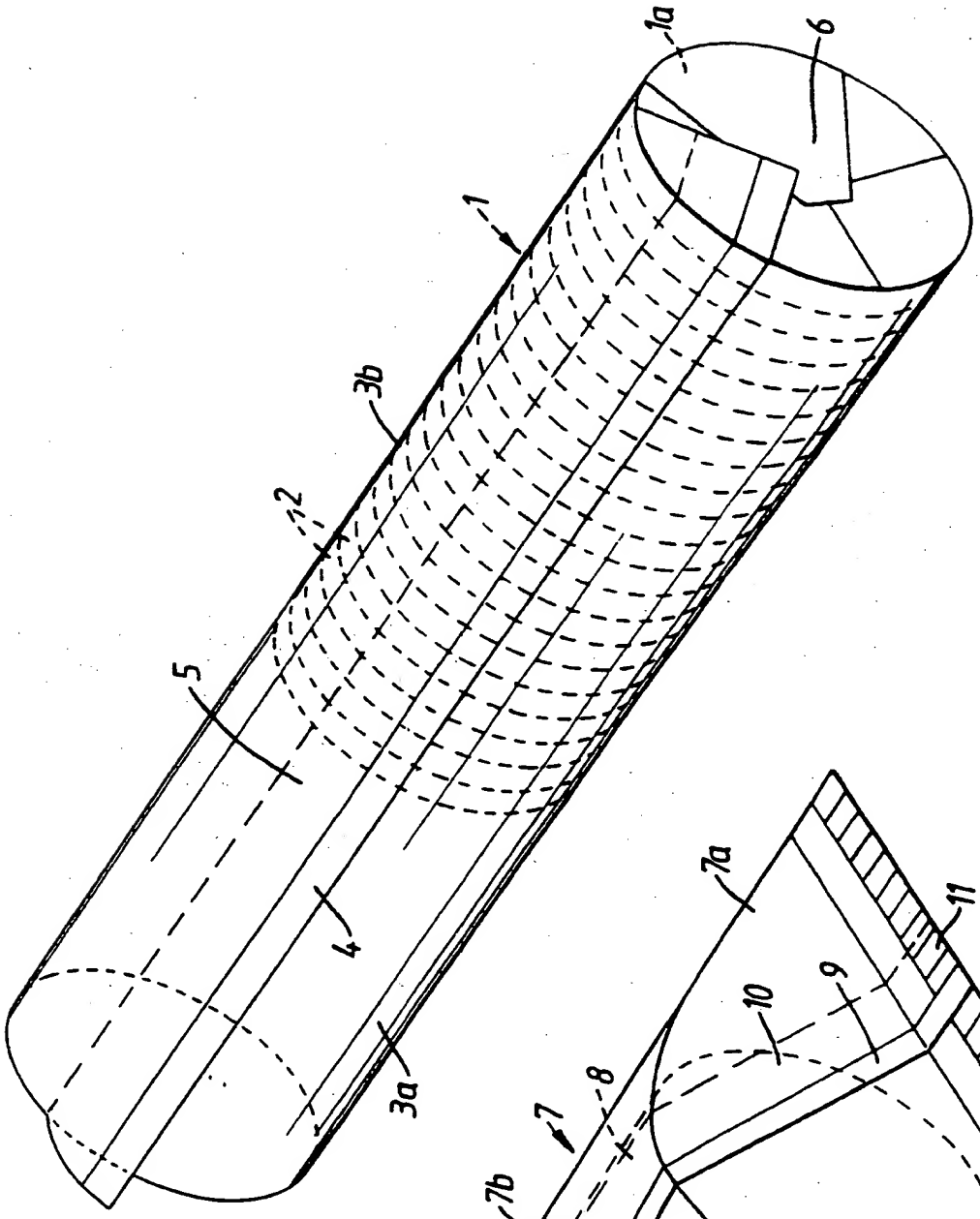


Fig.3.

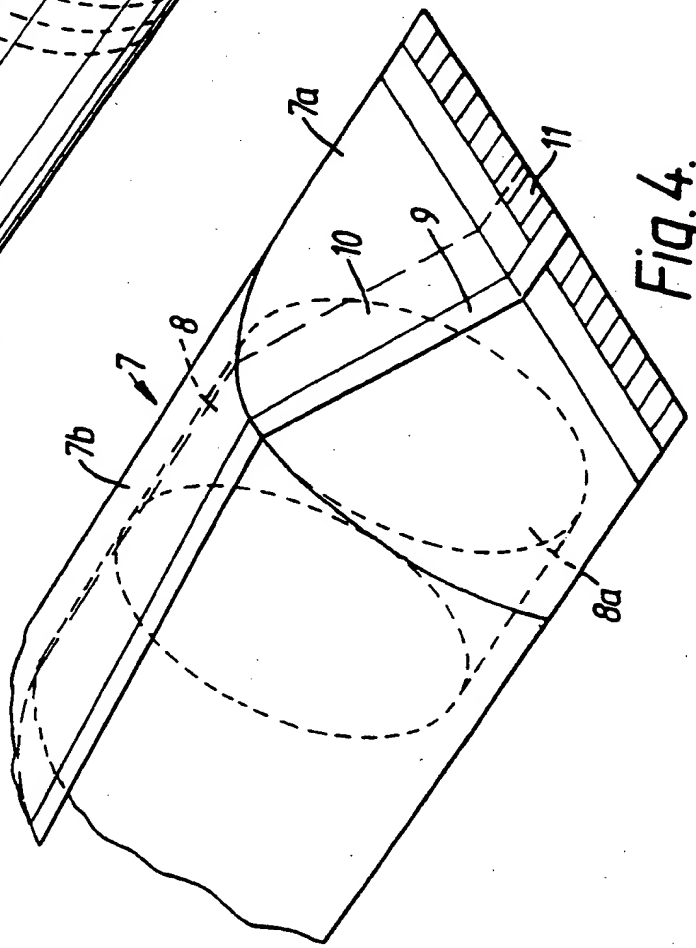


Fig.4.

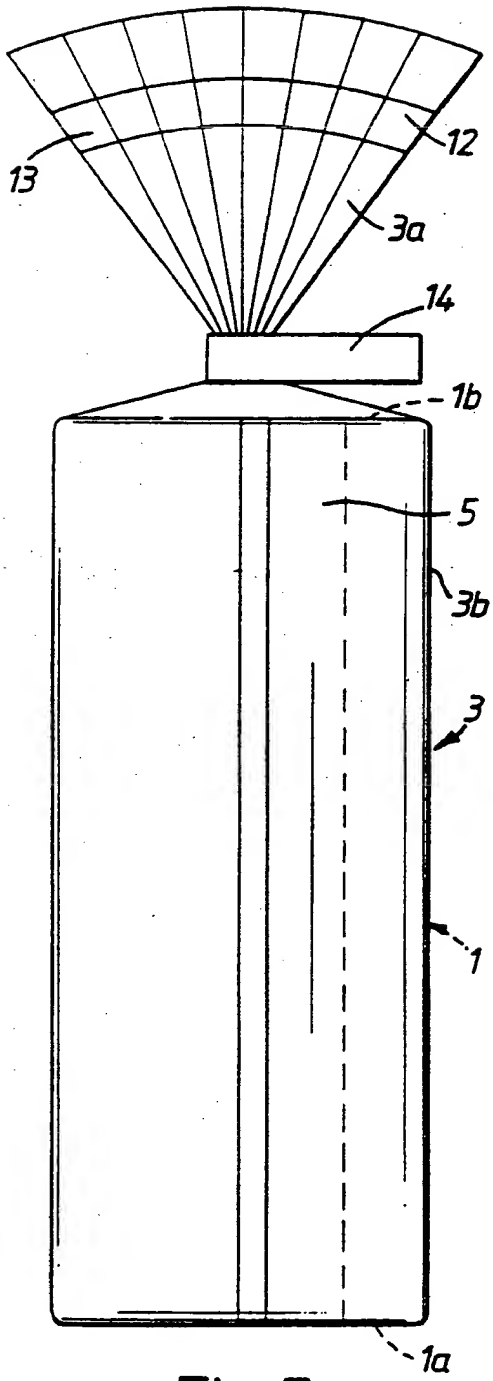


Fig.5.

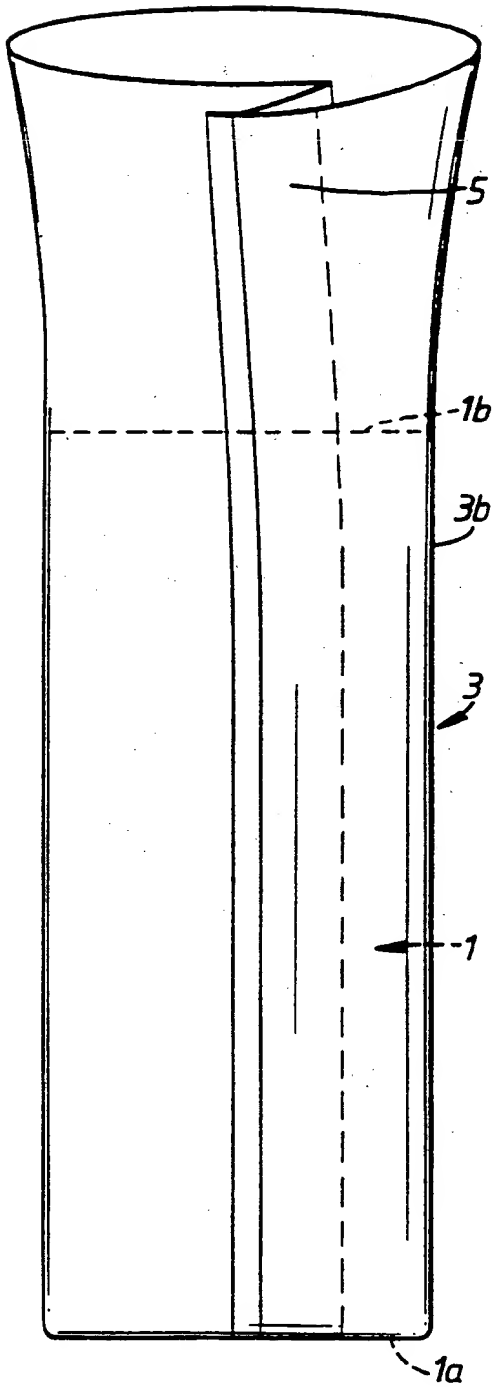


Fig.6.

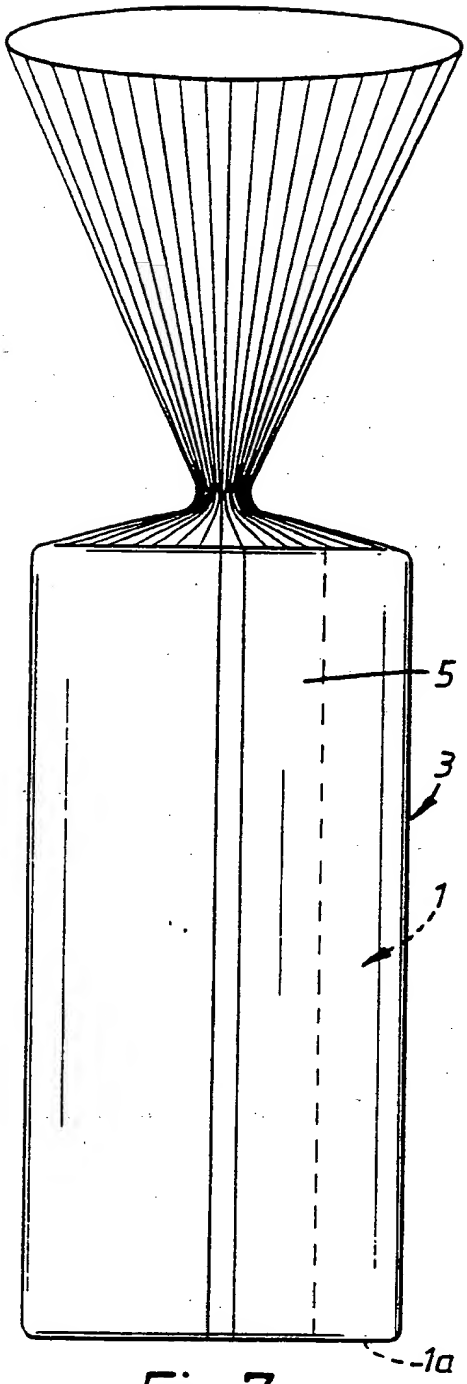


Fig.7.

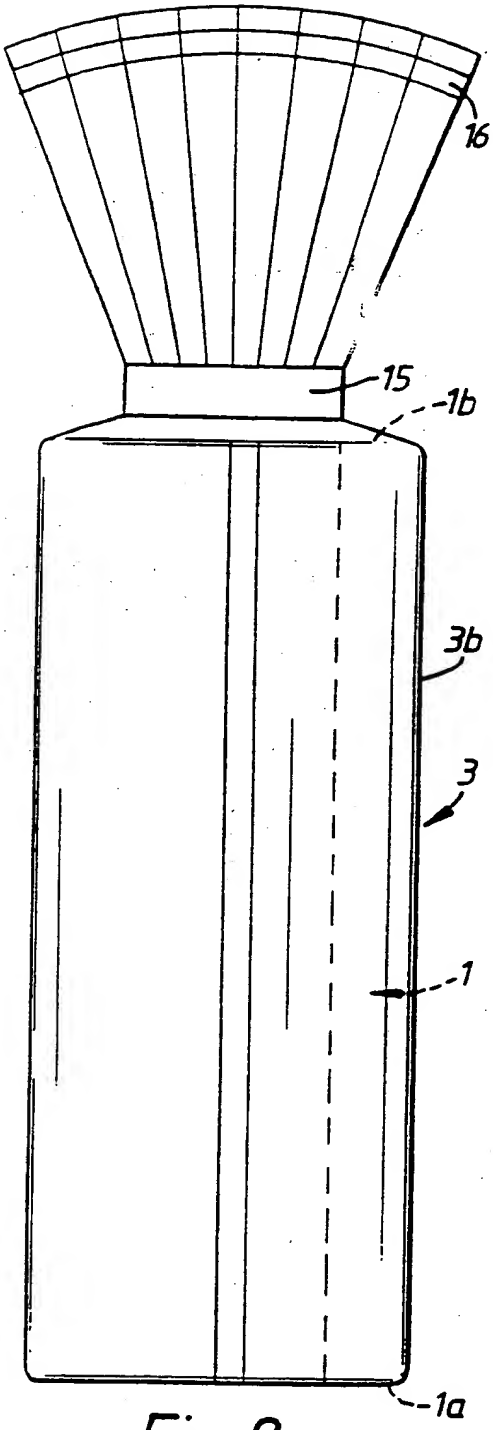


Fig.8.

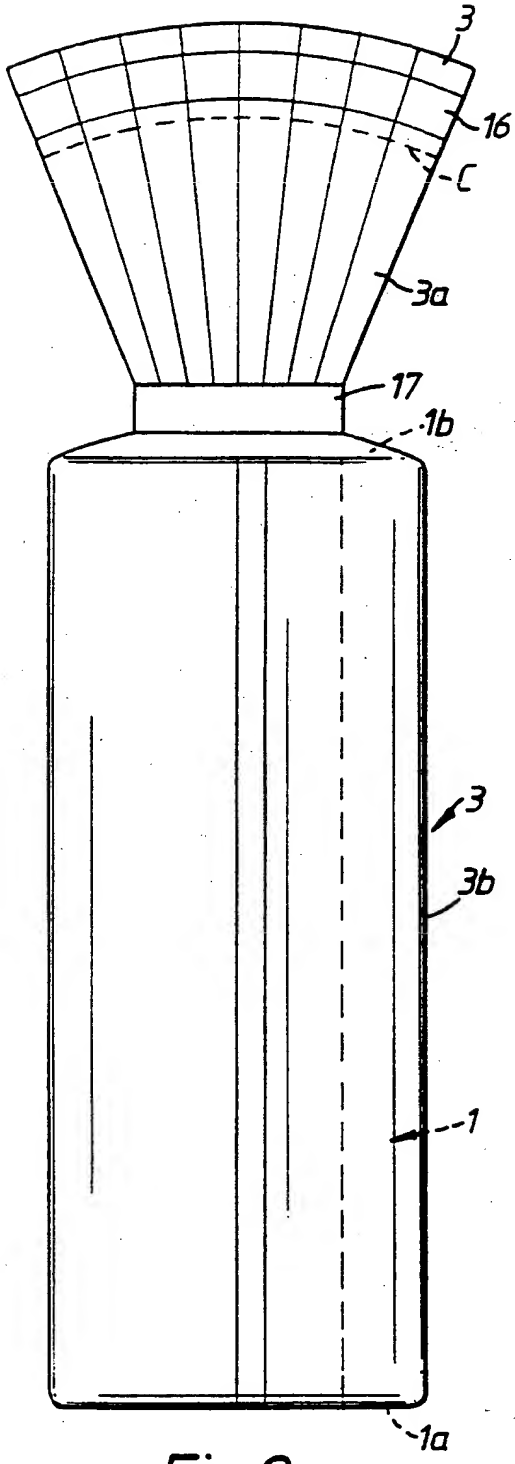


Fig.9.

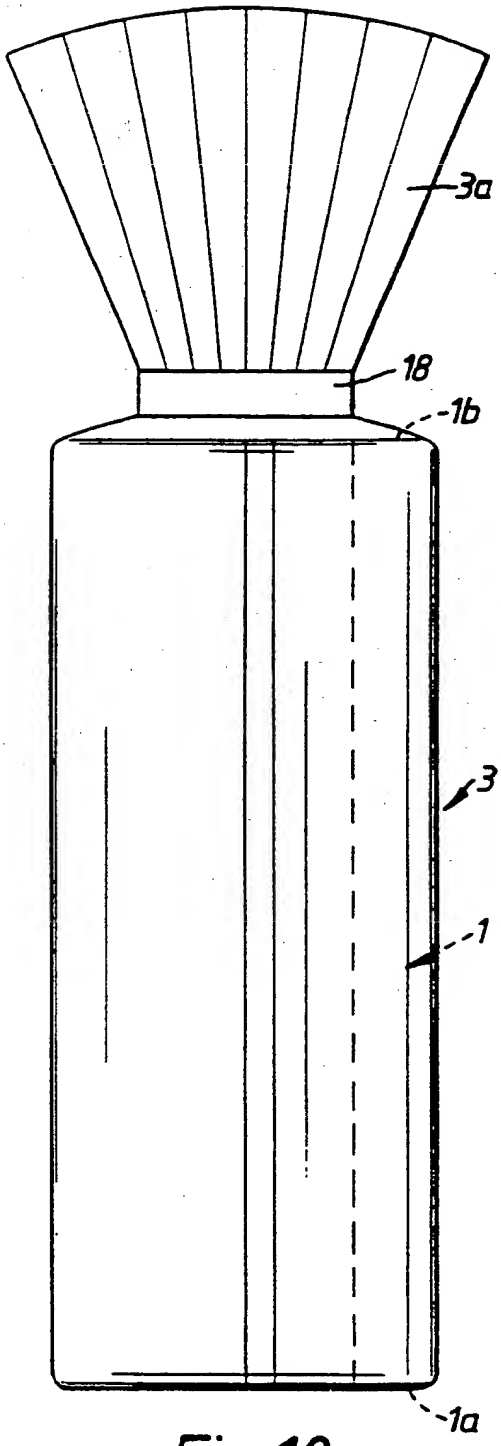


Fig.10.

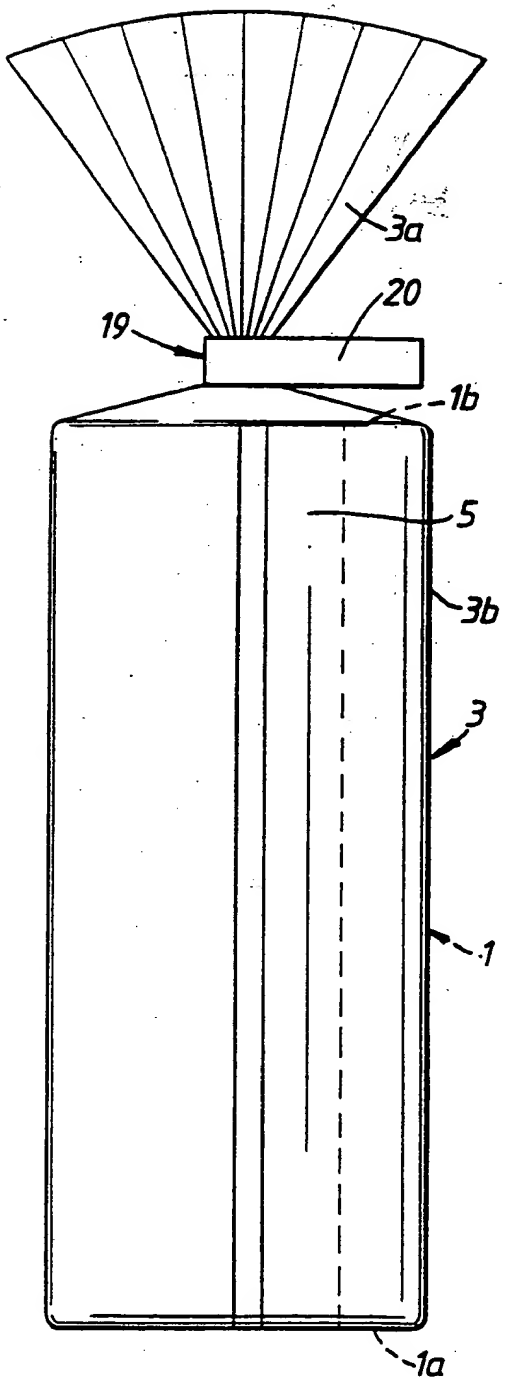


Fig.11.

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65D65/14; B65D75/58

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
A	US,A,3 311 289 (FRENCH) 28 March 1967 see column 2, line 45 - column 4, line 4; figures 1-5	1,47, 50-52, 57,58
A	US,A,3 366 313 (CULBERG) 30 January 1968 see column 2, line 36 - column 3, line 45; figures 1-5	1,50-52, 57,58

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28 AUGUST 1992	02. 10. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	VANTOMME M.A.

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9200886 SA 59359

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 28/08/92
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3311289		None	
US-A-3366313		None	

EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82